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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/563,047
Filing Date: September 18, 2006
Appellant(s): BEAUDET ET AL.

Julie K. Staple
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 05/17/2010 appealing from the Office action mailed 12/21/2009.

(1) Real Party in Interest

The examiner has no comment on the statement, or lack of statement, identifying by name the real party in interest in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The following is a list of claims that are rejected and pending in the application: Claims 1, 3-7, 9, 11, 12, 14-16, 18-25 and 27 are pending, rejected and under appeal.

(4) Status of Amendments After Final

The examiner has no comment on the appellant's statement of the status of amendments after final rejection contained in the brief.

(5) Summary of Claimed Subject Matter

The examiner has no comment on the summary of claimed subject matter contained in the brief.

(6) Grounds of Rejection to be Reviewed on Appeal

The examiner has no comment on the appellant's statement of the grounds of rejection to be reviewed on appeal. Every ground of rejection set forth in the Office action from which the appeal is taken (as modified by any advisory actions) is being maintained by the examiner except for the grounds of rejection (if any) listed under the

subheading "WITHDRAWN REJECTIONS." New grounds of rejection (if any) are provided under the subheading "NEW GROUNDS OF REJECTION."

(7) Claims Appendix

The examiner has no comment on the copy of the appealed claims contained in the Appendix to the appellant's brief.

(8) Evidence Relied Upon

4,359,641	Franks	11-1982
4,692,266	Costa	9-1987
4,594,179	Harrah	6-1986

Puseljie, D., et al. Liquid Capillary Scintillation Detectors, April 1990, IEEE Transaction on Nuclear Science, Vol. 37(2), pages 139-143.

Birks, J. B., et al., The emission spectra of organic liquid scintillator, 1963, British Journal of Physics, Vol. 14, pages 141-143.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. **Claims 1, 3, 4, 6, 7, 9, 11, 12, 14-16, 18 and 20-24** are rejected under 35 U.S.C. 103(a) as being unpatentable over Franks (US 4,359,641, IDS) in view of Costa (US 4,692,266), and Puseljic (IEEEE Transaction of Nuclear Science, 1990)

In regard to Claims 1, 3, 16 and 18, Franks teaches a multicomponent scintillation medium that comprises a first scintillator material, wherein the first scintillator material is a scintillation fluorescent Coumarin dye (Coumarin 540) (see Col. 3, line 31-68, Table 1). Franks teaches that the first scintillator (Coumarin 540 with a

pseudo-cumene as a solvent) has a fluorescent emission of 485 nm (see col. 3, line 64-66, Table 1, lines 9).

Franks dose not teach that the first scintillator is incorporated in a solid polymeric material. The use of solid polymers having Coumarin dye incorporated therein is well known in the art. For example, Costa teaches using solid polymer to hold Coumarin dyes (see Col. 6, lines 44-57). Costa further teaches that such a composition has a high counting efficiency, even for liquids which do not swell, dissolve, or penetrate the polymer (see col. 3, lines 1-3). At the time of the invention, it would have been obvious to one of ordinary skill in the art to use the solid polymer as taught by Costa to hold Coumarin because this would provide higher counting efficiency.

Franks is silent on the value of the "Stokes shift of at least 50nm" as required by claim 1. However, the Stokes shift is an inherent property of Coumarin 540. In this respect, Puseljic teaches that Coumarin 540 has a Stokes Shift of 125 nm (see Table 2). It follows therefore that the Coumarin dye of Frank would be expected to have a Stokes shift of 125 nm.

Frank does not specifically teach that when the first scintillator incorporated in a solid polymeric material will still have the emission wavelength in the range of 460-500 nm. Fluorescence occurs when an orbital electron of a compound relaxes to its ground state by emitting a photon of light after being excited to a higher quantum state by some type of energy. Therefore, the wavelength of fluorescent emission of a compound is determined by the energy difference of the molecular orbital of the higher quantum state orbital and the molecular orbital of the ground state of a compound. Therefore, the emission wavelength is an inherent property of a compound. The environment of the compound only has limited effect on the molecular orbital of the compound or emission wavelength. As shown by Franks, the fluorescent emission of the first scintillator material (Coumarin 540 with a pseudo-cumene as a solvent) has a fluorescent emission of 480, 485, 495, 500 nm, respectively (see Table 1) and the emission wavelength of cocktail of Coumarin 540 and BIBUQ is 485, 490, 500 nm, respectively (see Table 1). The variation of emission wavelength is in a limited range. When the first scintillator is

incorporated in a solid polymer material as taught by Costa, the modification of the environment should have limited effect on the molecular orbitals of the incorporated scintillator compound. Therefore, the effect on the emission wavelength should be limited.

In regard to Claims 9 and 11, Franks teaches a method of detecting and measuring radiation (see Col. 3, line 31-58). The method comprises the steps of:

providing a scintillations medium which comprising a solid body (a silica cells) which contains a first scintillator material, Coumarin 540 (see col. 3, line 31-68). The fluorescent emission of the first scintillator material (Coumarin 540 with a pseudo-cumene as a solvent) has a fluorescent emission of 485 nm (see Table 1, lines 9).

contacting the scintillation medium with an radionuclide analyte (see col. 3, lines 31-58); and

detecting any scintillation caused in the medium (see col. 4, lines 23-31, Figure 1).

Franks does not teach the value of Stokes shift of Coumarin 540. However, the Stokes shift is an inherent property of Coumarin 540. Puseljic teaches that Coumarin 540 has a Stokes Shift of 125 nm (see Table 2).

In regard to Claims 4, 14, 15, 20 and 21, Franks teaches that the scintillation medium further includes a second scintillator, BiBuQ. Franks further teaches that the role of BiBuQ in this system is to increase energy transfer efficiency from the pseudo-cumene to the Coumarin 540-A (see Col. 6, lines 19-21).

In regard to Claims 6, 7 and 22, Franks includes BiBuQ as second scintillator material. Franks does not teach using solid polymer bead to hold Coumarin dyes. The use of solid polymers bead having Coumarin dye incorporated therein is well known in the art. For example, Costa teaches using polymer to hold Coumarin dyes to form a coating on a solid support (see Col. 6, lines 44-57, 65-68). Costa further teaches that the support can be omitted if the coating is self-supporting (see col. 7, lines 1-2). A solid polymer bead is self supporting. Costa teaches that the polymeric material bonds the scintillator particles into a coherent but porous bead (structure) (see Col. 3, lines 31-43).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to use the solid polymer beads to hold Coumarin and BiBuQ dyes taught by Costa in Franks' method with reasonable expectation that this would make the scintillator dye easier to use.

In rear to Claim 12, as has been discussed in regard to Claim 6, Costa teaches that the solid body is a polymer bead. Franks teaches that the solid body is a vessel for retaining a liquid scintillation (see col. 6, lines 40-45).

In regard to Claim 23, Costa teaches that the polymeric material structure is sufficiently porous that can hold at least 50% volume of liquid (see Col. 3, line lines 31-43).

In regard to Claim 24, Costa teaches applying the scintillator composition coating to a surface of a sampling tray in a Packard Tri-Carb Liquid Scintillation Counter (see Col. 7, line 56-62). The sampling tray in Tri-Carb Liquid Scintillation Counter is known in the art to be configured to retain liquid samples.

3. **Claim 5** is rejected under 35 U.S.C. 103(a) as being unpatentable over Franks in view of Costa and Puseljic as applied to Claims 1, 3, 4, 6, 7, 9, 11, 12, 14-16, 18 and 20-24 above, and further in view of Birks (British Journal of Applied Physics, 1963).

In regard to Claim 5, Franks teaches using a second scintillator material, BiBuQ, to increase energy transfer efficiency from the solvent to Coumarin (see Col. 6, lines 19-21). The emission wavelength of cocktail of Coumarin 540 and BIBUQ is 485, 490, 500 nm, respectively (see Table 1). Franks does not teach using PPO or DPA as a secondary scintillator material. However, PPO and DPA are known scintillator materials. For example, Birks teaches using PPO and DPA as scintillator material (see abstract). Simple substitution of one known element for another to obtain predictable results is obvious according to recent Supreme Court ruling. (see *KSR International Co. v. Teleflex Inc.*, 550 U.S. , 82 USPQ2d 1385, 1395-97 (2007)) (see MPEP 2143). Because BiBuQ, PPO and DPA are known scintillator materials, therefore, simple substitution of one known element (BiBuQ) for another (PPO or DPA) to obtain predictable results (to increase energy transfer efficiency from the solvent to Coumarin

as taught by Franks) is obvious to one of ordinary skill in the art at the time of the invention.

4. **Claim 19** is rejected under 35 U.S.C. 103(a) as being unpatentable over Franks in view of Costa and Puseljic as applied to Claims 1, 3, 4, 6, 7, 9, 11, 12, 14-16, 18 and 20-24 above, and further in view of Harrah (US 4,594,179).

In regard to Claim 19, Franks teaches using Coumarin 540 as Coumarin dye. Franks does not teach using Coumarin 153 or Coumarin 152 as Coumarin dye. However, Coumarin 153 and Coumarin 152 are known Coumarin dyes with similar emission wavelength and Stokes shifts. For example, Harrah teaches Coumarin 153 is a scintillator with emission wavelength of about 484 nm and Stokes shift of about 135 nm (see Col. 7, lines 61-68). Simple substitution of one known element for another to obtain predictable results is obvious according to recent Supreme Court ruling. (see *KSR International Co. v. Teleflex Inc.,* 550 U.S. , 82 USPQ2d 1385, 1395-97 (2007)). Because Coumarin 540 and Coumarin 153 are known scintillator with similar emission wavelengths and Stokes shifts, therefore, simple substitution of one known element (Coumarin 540) for another (Coumarin 135) to obtain predictable results (to convert radiation into fluorescent emission) is obvious to one of ordinary skill in the art at the time of the invention.

Since Coumarin 153, disclosed by Harrah, is the same compound as recited in the instant claim 19, its fluorescence emission wavelength, after being incorporated into solid body, should be in the same range of 460-500 nm as recited in Claims 1, 9 and 16. The emission wavelength of Coumarin 153 in liquid state is about 484 nm as shown by Harrah (see Col. 7, lines 61-68). This is an example that the wavelength of fluorescence emission is an inherent property of a scintillator compound and its environment should have limited effect on the wavelength of the fluorescence emission.

5. **Claims 25 and 27** are rejected under 35 U.S.C. 103(a) as being unpatentable over Franks in view of Birks (British Journal of Applied Physics, 1963) and as further evidenced by Puseljic.

In regard to Claims 25 and 27, as has been discussed in respect to Claim 5 above, combined teaching of Franks and Birks teaches a liquid scintillation cocktail

comprising Coumarin dye as first scintillator material and PPO or DPA as second scintillator material. The emission wavelength of cocktail of Coumarin 540 and BIBUQ is 485, 490, 500 nm, respectively (see Table 1). Franks further teaches that the medium comprises pseudo-cumene as a solvent having Coumarin 540 dissolved therein (see Col. 3, lines 56-58). Franks does not teach the value of Stokes shift of Coumarin 540. However, the Stokes shift is an inherent property of Coumarin 540. Puseljic teaches that Coumarin 540 has a Stokes Shift of 125 nm (see Table 2).

Franks teaches that the fluorescent emission of the first scintillator material (Coumarin 540 with a pseudo-cumene as a solvent) has a fluorescent emission of 485 nm (see Table 1, lines 9).

(10) Response to Argument

A. Rejection of Claims 1, 3, 4, 6, 7, 9, 11, 12, 14-16, 18 and 20-24

In response to appellant's argument that no teaching is apparent in the Franks reference relating to fluorescent emission of a fluorescent material incorporated in a **solid body** or solid state member as described in independent claims 1, 9 and 16, Franks teaches that the first scintillator (Coumarin 540 with a pseudo-cumene as a solvent) is contained in a **solid body** (silica cells) and has a fluorescent emission of 485 nm (see col. 3, line 64-66, Table 1, lines 9). The use of solid polymers having Coumarin dye incorporated therein is also well known in the art. For example, Costa teaches using solid polymer to hold Coumarin dyes (see Col. 6, lines 44-57). Costa further teaches that such a composition has a high counting efficiency, even for liquids which do not swell, dissolve, or penetrate the polymer (see col. 3, lines 1-3). At the time of the invention, it would have been obvious to one of ordinary skill in the art to use the solid polymer as taught by Costa to hold Coumarin because this would provide higher counting efficiency.

In response to appellant's request for rationale or evidence tending to show that wavelength of fluorescence emission is an inherent property of a scintillator compound, fluorescence occurs when an orbital electron of a compound relaxes to its ground state by emitting a photon of light after being excited to a higher quantum state by some type

of energy. Therefore, the wavelength of fluorescent emission of a compound is determined by the energy difference of the molecular orbital of the higher quantum state orbital and the molecular orbital of the ground state of a compound. Therefore, the emission wavelength is an inherent property of a compound. The environment of the compound only has limited effect on the molecular orbital of the compound or emission wavelength. As shown by Franks, the fluorescent emission of the first scintillator material (Coumarin 540 with a pseudo-cumene as a solvent) has a fluorescent emission of 480, 485, 495, 500 nm, respectively (see Table 1) and the emission wavelength of cocktail of Coumarin 540 and BIBUQ is 485, 490, 500 nm, respectively (see Table 1). The variation of emission wavelength is in a limited range. When the first scintillator is incorporated in a solid polymer material as taught by Costa, the modification of the environment should have limited effect on the molecular orbitals of the incorporated scintillator compound. Therefore, the effect on the emission wavelength should be limited.

As an added proof, as has been discussed in regard to Claim 19 above, since scintillator Coumarin 153, disclosed by Harrah, is the same compound as recited in the instant claim 19, its fluorescence emission wavelength, after being incorporated into solid body, should be in the same range of 460-500 nm as recited in Claims 1, 9 and 16. The emission wavelength of Coumarin 153 in liquid state is about 484 nm as shown by Harrah (see Col. 7, lines 61-68). This is an example that the wavelength of fluorescence emission is an inherent property of a scintillator compound and its environment should have limited effect on the wavelength of the fluorescence emission.

In response to appellant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

B. Rejection of Claim 5

Appellant's argument in this section is based on section A. Therefore, no new argument needs to be addressed.

C. Rejection of Claim 19

Appellant's argument in this section is based on section A. Therefore, no new argument needs to be addressed.

D. Rejection of Claims 25 and 27

In response to the appellant's argument that neither Franks nor Birks, nor a combination of these references, provides information that a liquid scintillation cocktail comprising Coumarin dye as first scintillator material and PPO or DPA as second scintillator material " has a fluorescent emission in the range of 460-500 nm", Franks teaches using a second scintillator material, BiBuQ, to increase energy transfer efficiency from the solvent to Coumarin (see Col. 6, lines 19-21). The emission wavelength of cocktail of Coumarin 540 and BIBUQ is 485, 490, 500 nm, respectively (see Table 1). Franks does not teach using PPO or DPA as a secondary scintillator material. However, PPO and DPA are known scintillator materials. For example, Birks teaches using PPO and DPA as scintillator material (see abstract). Simple substitution of one known element for another to obtain predictable results is obvious according to recent Supreme Court ruling. [see *KSR International Co. v. Teleflex Inc.*, 550 U.S. , 82 USPQ2d 1385, 1395-97 (2007)] (see MPEP 2143). Because BiBuQ, PPO and DPA are known scintillator materials, therefore, simple substitution of one known element (BiBuQ) for another (PPO or DPA) to obtain predictable results (to increase energy transfer efficiency from the solvent to Coumarin as taught by Franks) is obvious to one of ordinary skill in the art at the time of the invention. Franks teaches that the emission wavelength of cocktail of Coumarin 540 and BIBUQ is 485, 490, 500 nm, respectively (see Table 1).

As an added proof, as has been discussed in regard to Claim 19 above, since scintillator Coumarin 153, disclosed by Harrah, is the same compound as recited in the instant claim 19, the wavelength of fluorescence emission of the cocktail of Coumarin 153 and PPO should within the similar range recited the instant Claim 25, because the

wavelength of the fluorescence emission is the inherent property of the scintillator compound. The emission wavelength of Coumarin 153 in liquid state is about 484 nm as shown by Harrah (see Col. 7, lines 61-68).

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

This examiner's answer contains a new ground of rejection set forth in section **(9)** above. Accordingly, appellant must within **TWO MONTHS** from the date of this answer exercise one of the following two options to avoid *sua sponte* **dismissal of the appeal** as to the claims subject to the new ground of rejection:

(1) **Reopen prosecution.** Request that prosecution be reopened before the primary examiner by filing a reply under 37 CFR 1.111 with or without amendment, affidavit or other evidence. Any amendment, affidavit or other evidence must be relevant to the new grounds of rejection. A request that complies with 37 CFR 41.39(b)(1) will be entered and considered. Any request that prosecution be reopened will be treated as a request to withdraw the appeal.

(2) **Maintain appeal.** Request that the appeal be maintained by filing a reply brief as set forth in 37 CFR 41.41. Such a reply brief must address each new ground of rejection as set forth in 37 CFR 41.37(c)(1)(vii) and should be in compliance with the other requirements of 37 CFR 41.37(c). If a reply brief filed pursuant to 37 CFR 41.39(b)(2) is accompanied by any amendment, affidavit or other evidence, it shall be

treated as a request that prosecution be reopened before the primary examiner under 37 CFR 41.39(b)(1).

Extensions of time under 37 CFR 1.136(a) are not applicable to the TWO MONTH time period set forth above. See 37 CFR 1.136(b) for extensions of time to reply for patent applications and 37 CFR 1.550(c) for extensions of time to reply for ex parte reexamination proceedings.

Respectfully submitted,

/ROBERT XU/

Examiner, Art Unit 1797

Conferees:

/Vickie Kim/

Supervisory Patent Examiner, Art Unit 1797

/Anthony McFarlane/

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